

ASF NEWSLETTER

THE AUSTRALIAN SPELEOLOGICAL QUARTERLY



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ASF NEWSLETTER

1984:104

TABLE OF CONTENTS

Editorial	- Caving in Tasmania	S Nicholas	1-2
Notes on the ASF	- Reports		2-4
Letters to the Editor			4
M4 Cave Survey		G Netherwood	5-10
Safety and Techniques	- ASF Abseiling Guidelines	J Bateman	11-12
	- Which Rope is Best?	A Warild	13-14
Down Under All Over			15-16
Notices and News			16

The opinions expressed in this Newsletter are those of each author and are not necessarily those of the ASF Incorporated or the Editor.

EDITORIAL

CAVING IN TASMANIA

- GEAR AND TECHNIQUES FOR SPELEOMANIACS

The purpose of this article is to provide some information for those of you contemplating going to the ASF Conference to be held in Tassie during January 1985.

Caving in Tasmania is, in general, unlike anything else found in Australia. Conditions are wetter, colder and certainly much less pleasant than most other places around the country. This fact cannot be over emphasised. If you are interested in a field trip before or after the conference proper, you MUST have the right clothing and personal gear. Tasmanian caves are renowned for their severity and unfortunately cases of hypothermia/exposure, particularly amongst visitors, are quite common. ASF Newsletter 101 has an excellent article by John Webb covering an incident in the Junee Florentine during Easter 1983. If you are not sure about the signs and symptoms of this often insidious complaint, read up on it or ask someone who knows, but make sure you can recognise it. Left untreated, the victim can become helpless and potentially die within a surprisingly short time. Make sure you know how to treat the person affected, and you have the required clothing and so on with you to do it.

Trips underground in Tassie tend to be fairly long - ten or twelve hours is not uncommon. However speed is important as standing around you become very cold very quickly which makes you want to stand around even more, and so on. This can put you into a non-reversible spiral that ends in that great big cave passage in the sky. It is important that you are fit and

OR

HOW TO SURVIVE YOUR TASSIE TROG TRIP

prepared for the cold and wet underground environment found in most Tasmanian caves. If you are not fit enough to maintain a pace that keeps you warm and still allow you to keep going at that pace, you are in big trouble, as are the other party members. An accident victim, if unable to move at a reasonable rate will probably not die of his/her injuries, but exposure will take its toll before a rescue can be instigated. High energy food must be carried, such as jelly beans or chocolate, as energy usage is quite high. Periodic consumption of some food also helps guard against the dreaded hypothermia. Try to take food that does not have individual wrappers for each sweet or whatever and pack it in something waterproof and strong.

Clothing is a difficult topic as most of you will only be here for a short time and probably will not return for some years, if ever! However, as mentioned above, we want to send you home alive so don't skimp on your personal gear. Most people caving here regularly wear fibre pile or several layers of chlorofibre (thermal underwear) under some sort of semi-waterproof oversuit such as an Enduro suit or the old style BusyBees. Neoprene wetsuit booties are excellent worn as sox inside rubber or plastic industrial boots or "wellies".

Gloves are almost an essential for those of us with office jobs and soft hands! A thin balaclava worn under the helmet is a great way to keep your feet warm as a considerable amount of heat is lost from your head! Certainly it is

NOTES ON THE ASF

essential to avoid cotton gear of any sort as cotton materials tend to "cling", particularly when wet, and act as a great heat exchanger from you to the outside world. If you don't believe it try standing under a cold shower for a while wearing a T-shirt and jeans. Silly though it may seem, this is actually a fairly good test of the suitability of your clothing setup (so long as the shower is COLD)!

Possibly a good setup consists of two pairs of thermal long-johns, a long sleeved thermal singlet with a high neck and a thick wool shirt or fibre pile jacket worn over the top. The whole lot can then be covered by a strong synthetic over-suit of the same sort. Wetsuit booties complete the ensemble as mentioned above. This gear is fairly universal and most can be used for bush walking and so on as well. Wet suits do not generally lend themselves to Tassie style caving as they add considerably to the amount of physical work you have to do, make climbs difficult and have a nasty tendency to chafe. Caves here, although very wet in places, have dry sections as well and a semi-dry wet suit is not very comfortable, as well as draining heat from you while drying, and/or making you unbearably HOT. Swimming is almost never required in Tasmanian caves (except during flash floods!). The conference is during summer and although snow is possible in some areas of the state, most streams will be fairly low and relatively warm at around 8 degrees celsius. In winter the stream temperatures drop to around 3 or 4 degrees, or less with snow.

Needless to say, the actual gear and the amount of it you need depends to some extent on the areas you visit. Mole Creek in the north of the state provides probably the warmest and easiest caving while the Florentine Valley provides the wettest, coldest and most vertical caving in Australia. Mt Anne has the potential for great depth but is relatively dry, however caving there for any time is something of an epic being as it is remote and alpine in nature. Ida Bay and surrounds probably has the worst weather as well as long horizontal caves and vertical ones too! The verticals however are basically dry while the horizontal ones (eg Exit) are wet and prone to floods. Energy expenditure in these apparently easy caves can be a lot greater than you think and mild exposure cases have been seen in Exit on several occasions.

Do not underestimate any of the areas - all are potentially very wet and cold and could lead to someone not going home in the condition in which they arrived. Make sure it isn't you or any of your friends.

Should you require further information on gear, recognition and treatment of hypothermia/exposure or any other technique or gear related topic, please don't hesitate to contact us. More specific information will be sent to the individual form respondents, depending on their requirements and areas of interest.

This article may be regarded by some as rather melodramatic, but the risks are real, and sooner or later someone will succumb to the cold and a death will occur, probably after a relatively minor accident. Quite a number of potentially severe cases of exposure have occurred

underground in Tasmania and it is probably only through good luck that the victims (and their rescuers) have got out alive and well.

Stuart Nicholas - co-convenor SPELEOMANIA

PRE-COUNCIL READING

In an effort to inform the general membership of the various committees and executives activities prior to the January Committee meeting, I asked for a summary of all reports to be presented in Hobart. The following are those received prior to printing.

Ian Mann

VICE PRESIDENT'S REPORT 1984

RAULEIGH WEBB

1984 was a quiet year for the ASF in Western Australia with only a few matters requiring the attention of the Vice-President. At the completion of the committee meeting in Jan 1983 several specific tasks were allocated to the three Vice-Presidents. As a result I was given few exacting tasks as I was also Convenor of the Commission on Conservation.

All that I have to report from the Vice President's point of view is that I was able to answer several questions that were put to me at meetings in Western Australia that pertained to the activities of the Federation. In my capacity as Vice-President I corresponded with a member of CEGSA who was unfortunately denied access to a locked cave in Western Australia due to a series of errors on the part of members of our Cave Access Committee. I hope that my letter fully explained the situation to the CEGSA member involved and that no ill feeling resulted.

I have also had correspondence during the year from Ken Grimes regarding survey standards and he has a number of very good ideas in this area and I hope that he has submitted a report to promote some discussion and evaluation of his and my suggestions.

With respect to ASF Handbook a great deal of time has been spent in trying to get the thing moving. At present in WA we are about three quarters of the way through filling out the updated forms. These are extremely time consuming and have produced headaches for all thirty five people we have had filling them out!! By about 1999 the Western Australian forms should be complete. I hope that the other states are in front of us in this respect and if they are I would be pleased to know how they managed!!

The updated forms have been submitted to Peter Matthews and those not yet completed have also been sent to him in the hope of getting at least the old information into the book.

I hope that the meeting goes well and that during 1985 we can see the completion of the ASF Handbook. Many thanks to John Dunkley and the secretarial circulars for keeping myself and the rest of the committee informed of exactly what is happening in ASF, they are worth producing.

Due to work pressures I will not be available to stand for any positions within ASF but I would like to take this opportunity to thank all those people who have helped me over the years. I would also like to say that I was greatly saddened to learn of the death of Joe Jennings. I do not believe that Australian Speleology will ever be able to replace him - my sincere condolences to his family and many friends throughout Australia.

INTERIM ASF TREASURER'S REPORT 19-10-84.

LLOYD MILL

This is not my final report as the ASF books for 1984 will not be closed until early December. The report to be presented to the meeting in Hobart will be based on the finances at that time. The purpose of this report is to give club members a rough idea of how things are going and what has happened this year.

ACCOUNTS

During the year I changed all the bank accounts from Westpac to the Commonwealth Bank. The reasons for this change were twofold; poor service from the Westpac branch I was using and the convenience of the Commonwealth Bank to my work.

ASF currently operates the following accounts:

1. **Cheque Account:** This account has at present, \$641.94 in it. It is used for the normal running of ASF and most expenses (including payments to the Newsletter) come from this account. When money builds up in this account the excess is moved to the:
2. **Overflow Account:** This is a savings investment account which currently has \$3000 in it. This is a flexible way of earning extra interest, in contrast to the more rigid Interest Bearing Deposits Used previously.
3. **Conservation Fund Account:** Savings Investment Account containing \$551.50. This is the unused S.W.Tasmania money that is being held in reserve to be called upon if a conservation issue arises and money is needed quickly.
4. **Publication Account:** Savings Investment Account containing \$851.97. This account was set up a number of years ago. I'm not sure of the exact purpose, but it has something to do with supporting Australian Speleological publications. I intend to suggest at the Hobart meeting that this account be wound up and the money used for some other purpose.
5. **Edie Smith Award Account:** Building Society Account containing \$245.05. This account is used to finance the biennial Edie Smith award.

APPROXIMATE STATE OF THE FINANCES

INCOME			
1983 Member Capitation Fees	\$	222.00	
1984 " " " "	\$	3284.50	
1984 Associate " "	\$	140.00	
Interest	\$	39.00	

EXPENDITURE

Newsletter	\$1600.00
I.U.S.(2yrs)	\$ 448.48
A.C.F.	\$ 45.00
Secretary and Ass.Secretary	\$ 15 00
Treasurer	\$ 74.92
President	\$ 536.13
Federal & State Taxes	\$ 8.06
Bank Charges	\$ 5.00
	<u>\$2732.59</u>

CAPITATION FEES 1984

The following clubs have paid for this year, in this order;

MEMBERS CQSS, UQSS, SCS, MSS, KSS, NC, HSC, SRGWA, MUCG, CSS, UNSWSS, HCG, SUSS, EC&RC, OSS, RANCA, BMSC, VSA, CTCG, TCC, NUCC.

ASSOCIATES NWWC, CCOG, CCC, ASS, Darwin Group, CCC(Tas), NQSA

If you are a member of a group which has not paid (like ISS, WASGA, CEGSA) please remind your treasurer that you are late!

CAVE CONVICT

PHILLIP MACKEY

The only aspect outstanding from CAVE CONVICT are the proceedings. The editing of these is nearing completion and hopefully will be finished by SPELEOMANIA.

CONSERVATION COMMISSION

RAULEIGH WEBB

During the Year a number of conservation issues have been addressed by the Convenor. In particular matters relating to the proposed introduction of Cave Protection Legislation into Australia. At present only the United States of America (USA) has any significant claim to having effective cave protection legislation. After correspondence with Sharon Kautto of NSS I have been given current copies of the cave protection legislation that exists in the USA at present.

In Western Australia proposed legislation is currently before the Crown Law Department for drafting into an act which will then be placed before cabinet. If the legislation is endorsed by the cabinet it will have a very good chance of becoming law. Once the legislation is passed in Western Australia I believe that other states may be coerced into following suit and enacting similar legislation.

With respect to the Darwin to Alice Springs railway line, our comments on the Environmental Impact Statement were totally ignored with the final report noting that the Karst area had been taken into account.

Following endorsement of a policy, for the removal of non-tourist cave names from publically available maps, made by the ASF Conference on Cave Tourism and Management, approaches have been made to the relevant mapping authorities in an attempt to have non-tourist cave names removed from future map publications. These approaches have as yet not borne fruit but if pressure can be applied at a state as well as federal level then eventually we may have some joy in this area.

After several letters to the WA Minister for the Environment funds were made available for the gating of Golgotha Cave in the South West of WA. Some funds were also spent on restoration work in the cave. Without this small amount of funding I am sure that the cave would have suffered even greater damage than it has done to date.

For the two years that I have been convenor, except for Adrian Davey, I have had no contact from states other than Western Australia. Therefore, I believe that I must bow to Adrian's suggestion made at the last ASF Conference in Adelaide, that the Commission on Conservation should be absorbed into the Commission on Cave Management and Tourism.

Due to enormous work pressures I will be unable to continue in the position of Convenor and unless a strong argument to the contrary can be put forward I would suggest that Adrian's suggestion be accepted.

PS Many thanks to those persons who forwarded copies of club newsletters to me as they are the only way that I had of knowing if anything was happening in the Eastern States

NEWSLETTER MANAGER

IAN MANN

In all four newsletters have been (or will be) published during 1984 (102, 103, 104, 105). Again I have had problems where certain clubs have not sent in any current address lists. In these cases I can only assume that the lists are the same as for the previous year. An address list should be sent to the Newsletter Manager each year as well as to the Treasurer.

On the other hand I must sincerely thank those clubs who supply lists on a regular basis (it makes the job a lot easier). Apart from the address list problem the newsletter managership has run smoothly during 1984 and if it is the desire of the Council of the ASF I am prepared to continue in this position during 1985.

Letters to the Editor

MARACOOPA HUT

The Southern Caving Society has received news of complaints made by the land owner on whose land the Maracoopa Hut (at Mole Creek, Tasmania) is situated. He has complained that there has been camping outside the hut and that dogs have been brought onto the property. If this continues, access to the hut may well be barred.

All those who wish to use the hut must heed the rules

NO CAMPING is allowed on the property except in the hut.

NO PETS are permitted on the property (there have been problems with snarling dogs).

For those who wish to camp in tents, the WET CAVE CAMPSITE at Caveside is the recommended alternative providing respect is paid to both the landowner's gates and stock. Those attending SPELEOMANIA please note.

Information from David Ziegler, Secretary, SCS

It has come to my attention through the columns of the ASF Newsletter that a flagrant and shocking breach of the statutes and regulations pertaining to the protection and use of caves in NSW has occurred. One assumes that Dempsey and Bament (Guano Article Issue #102) had the necessary authorities to enter the caves at Jenolan administered by the Department of Leisure Sport and Tourism. However, interference with the conduct of tourist parties, however warranted, is a possible breach of the ASF Code of Ethics; this appears to have occurred at both Jenolan and Yarrangobilly.

Much more seriously, however, are the events which occurred at Yarrangobilly on 10 Jun. The offenders had no permit for caving at Yarrangobilly, no tickets for cave inspections and have not submitted a report to the Park's Service on their findings. Further they were possibly in a tourist cave without a guide as there was no public inspection of Jersey Cave at the time and date stated! These are all offences against the Public Monies Act 1822 and the National Parks and Wildlife Act 1974 and regulations thereunder.

Given that the extension of the original intent of the trip appears to have been involuntary the Service proposes to take no further action on these offences. However, such activities are not condoned without the necessary paper warfare and, if the situation proves as the writer suggests, future exploration parties will require permits from the Service, the Department of Leisure Sport and Tourism and private landholders. This is necessary in order to keep the file properly filled.

Yours faithfully

A P Spate Investigation Officer Karst NSW NPWS

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M4 CAVE SURVEY

This article describes the techniques which were used in surveying Cave M4 and briefly explains the principles on which they are based. The author feels ideally qualified to write it as he has too little knowledge of the subject to confuse his audience and bases his information on empirical observations of one Peter Ackroyd around and about Murrindal during 1982. As a first step the instruments used are summarised:-

COMPASS

The compass is a basic tool of surveyors, mariners and explorers and can be obtained in a variety of types and styles, from those found in Christmas crackers upwards. For cave surveying a good quality liquid filled sighting type is required.

The function of a compass is to sense the direction of the natural magnetic field of the earth, which runs roughly North - South, and hence to allow the direction of True North to be determined. Because the magnetic field of the earth is slight and is easily affected by external factors the compass is not an accurate instrument. When using a compass three factors must be taken into account.

- (1) Deviation The direction of the earth's magnetic field varies with location and may be to the East or West of True North. The deviation for a given region is shown on the appropriate map.
- (2) Distortion Even small amounts of ferrous materials or electric equipment will alter the magnetic field locally. The author's quartz watch affects his compass by about one degree.
- (3) Inaccuracy Individual compasses may be inaccurate either all around the scale or at certain positions. One basic orienteering type was up to 5° out and any compass used for surveying should be regularly calibrated.

CLINOMETER

The compass measures the horizontal angle of a target with respect to North whereas the Clinometer measures its vertical angle with respect to the horizontal. There are various types but all use the force of gravity to detect the vertical direction and hence establish a horizontal reference. This can be done by means of a weight (e.g. the Suunto) or a spirit level (e.g. the Abney).

The clinometer is inherently more accurate than the compass (because the gravitational field of the earth is stronger than the magnetic field). They should however be calibrated by measuring the vertical angles between two objects in both directions and checking if the readings correspond.

MINERS DIAL

The miners dial combines the functions of the compass and the clinometer but because it is tripod mounted and incorporates a sighting telescope it is more accurate than those two hand held devices. A further advantage is that accurate compass bearings can be taken of objects at significant vertical angles whereas with a sighting compass they must be more or less at the same level.

The Miners Dial is rugged enough to be used, with care and discretion, inside a cave. It should be calibrated, the compass as for a compass and the clinometer as for a level. It is also worth checking that the telescope swings truly in the vertical plane by sighting on a plumb bob string and viewing it along its length.

THEODOLITE

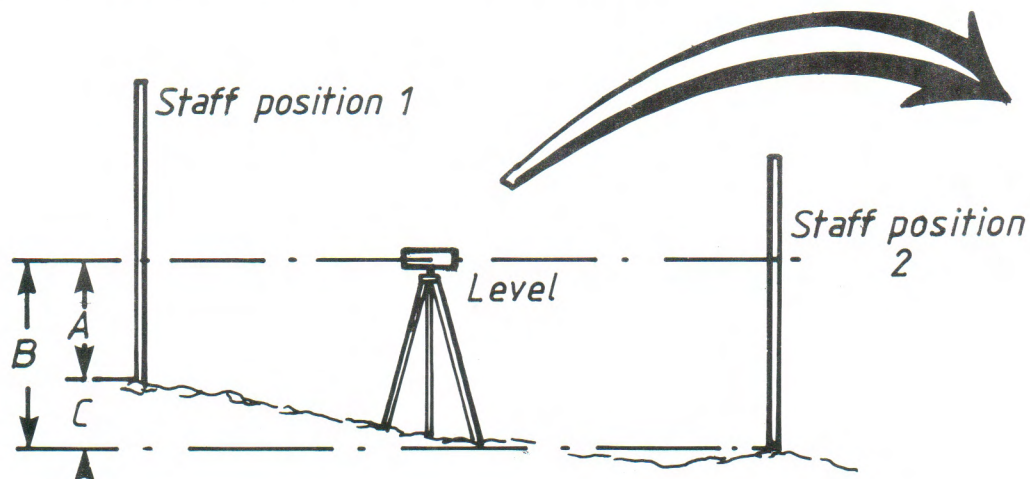
The theodolite is a high precision instrument used where very accurate surveying is required. It is several thousand times more accurate than a miners dial but must be handled with great care if it is to stay that way. A theodolite would not normally be taken into a cave but is useful for surveying over large distance, with accuracy.

The theodolite does not incorporate a compass but is used to measure the angle between targets in both the horizontal and vertical plane in a technique called triangulation. The complexity of the instrument lies within its optical systems which are used to sight a target and to read its scales to within a second of arc. The instrument also incorporates the facility to carry out a rather neat technique called tacheometry which is used to plot contour lines very rapidly.

LEVEL AND STAFF

The level and staff are used to accurately determine the differences in elevation of points some considerable distance apart.

The level is fundamentally a tripod mounted sighting telescope which is free to rotate but always points horizontally. The staff is an aluminium measuring stick which extends telescopically to 4 meters in length. In use the staff is positioned on a selected point on the ground and read through the telescope on the level. The staff is then moved to a second point, on the opposite side of the level and about the same distance from it and the reading repeated. The difference between the two readings is the difference in height of the two points.



Difference in height of foot of staff between position 1 and 2 $C=B-A$

For next reading level moves as shown staff stays at position 2 and then to 3 (Not shown)

DIFFERENTIAL LEVELLING

To calibrate the level a reading of the staff at two positions is taken in the usual way. The level is then repositioned near to but to one side of one of the positions and the readings repeated, the difference in height of the two positions should be the same if the level is accurate.

TRIANGULATION

We decided to survey M4 with reference to Australian Map Grid (AMG) co-

ordinates, this meant that our starting point had to be somewhere which had already been located accurately on the AMG. The nearest available points were Mcleod Trig and Johnston Tower, however there was a problem - neither of these points could be seen from anywhere in the cave or indeed anywhere near it. We were not deterred, or at least Peter wasn't, the solution was simply to select intermediate points.

We chose two secondary points which we christened Brownbridges Knob and Henham Hill. Permanent marks were made on each, a nail driven into the exposed bedrock at Brownbridges and a metal plug set into concrete in the earth at Henham. Because of the distances involved, up to 11 km, the accuracy of a theodolite was essential to give useful results.

Triangulation is based, as the name implies, on the geometry of triangles. The basic requirement is to have three points, two with known positions and one to be found. Each of the three points must be visible from each of the others and thus the three points forms a triangle

The theories of triangles decree that if the length of one of the sides and two of the internal angles are known it is possible to calculate any other feature. The length of one side, the distance between Mcleod and Johnston, was known and so it was only necessary to measure the horizontal angles using the theodolite.

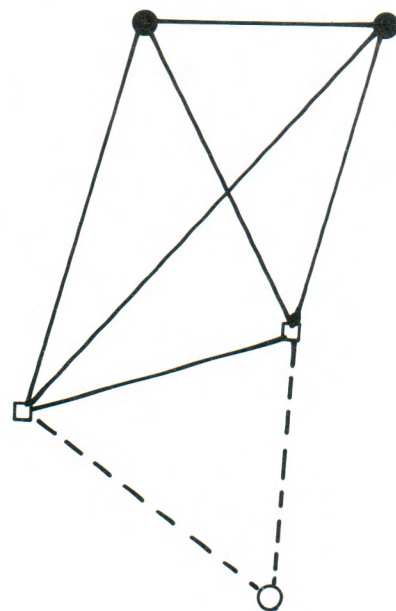
It may be worth clarifying the concept of horizontal and vertical angles. A map is a representation of the ground in the horizontal plane (as though looking from high above), thus the position of a feature on a map is independant of its height. To draw a map the angles between two actual features must similarly be measured in the horizontal plane in order to calculate the horizontal distance between them. The height of the feature can likewise be calculated using the vertical angle. The theodolite does allow horizontal and vertical angles to be measured separately. When measuring angles in the horizontal plane the position of the telescope in the vertical plane is irrelevant and may be considered merely a convenience to allow the target to be accurately sighted. When measuring angles in the vertical plane the converse is true.

In practice a self checking system called the "Braced Quad" was used rather than a simple triangle (see Figure) this measures all the permutations of triangles formed by joining four points and enables errors to be averaged out. The Earth is actually more or less spherical and the problems involved in fitting a spherical earth on a flat map have irked cartographers for centuries. The calculations necessary to convert the results into map references are accordingly complex and are best carried out by a suitably programmed computer - the Cave Records Officer does have access to one.

BRACED QUAD

- AMG Points (Johnson, Mcleod).
- Secondary Points (Brownbridge, Henham)
- Final Point (VSA 823)

ABCD forms a "Braced Quad" when all internal angles measured.



It is very hard to see a nail head on the ground from 11 km and even if one could various optical effects could cause errors, the target should be within a clear area of at least 1 meter radius from the line of sight. A tripod was therefore erected over each of the points and centered with a plumb bob. The business of finding and accurately sighting a target is fraught with difficulties over this kind of distance, cladding the tripod in either black plastic sheet or aluminium foil depending on background is effective. The use of the two way radios saves a great deal of trouble.

This allowed us to calculate the AMG references of the points on Brownbridges (E609016.324 N585598.841) and Henham (E606184.966 N5856786.66). Using these as known points the procedure was repeated to find the position of a point by the roadside, VSA 823 (E607200.355, N589570.296). The self checking system showed that the precision of these points was within 150 millimeters.

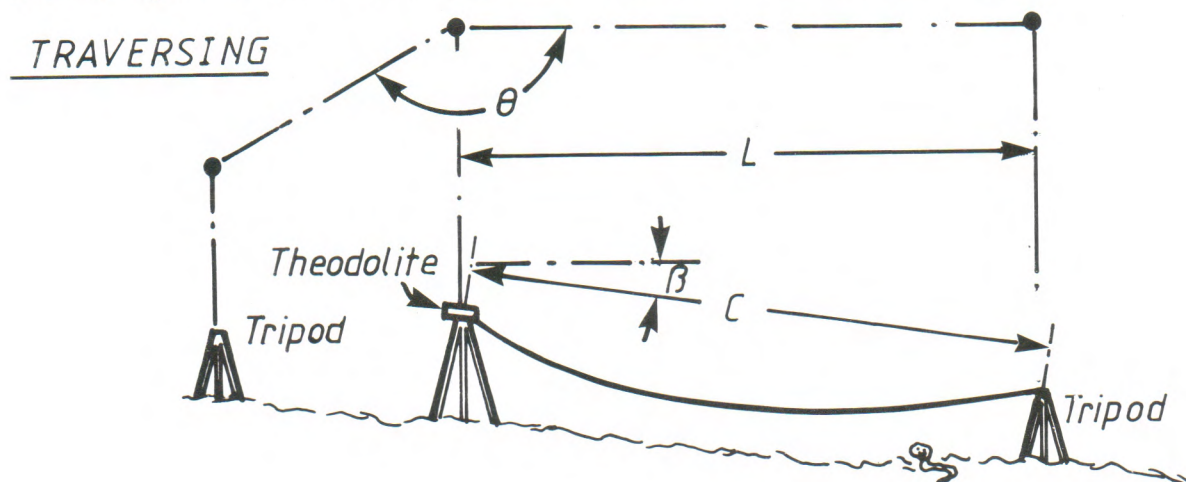
DIFFERENTIAL LEVELLING

It had always been supposed that the blue flashes occasionally seen on roadside trees were medication for some dreadful eucalyptus disease but in fact they signify the presence of a nearby benchmark. The height of the benchmark is shown on Land Survey Maps. Rather than rely on vertical angles we used the staff and level technique described earlier to establish elevations.

We started from VSA 823, proceeded to the nearest benchmark and then down to the cave entrance and back to VSA 823 in a large loop. Accuracies achieved by this method are about 3 mm error per kilometer.

TRAVERSING

The next step was to survey from VSA 823 to the cave entrance and for this the technique of traversing was used. An alternative method would have been to use the Miners Dial, this would have been somewhat faster and although less accurate still acceptable. However in the event the theodolite was chosen and in preparation a line of temporary markers, stakes with a nail driven into the top, was driven into the ground, from VSA 823 to the cave entrance and back at distance apart of some 85 meters. The method is illustrated in Figure 5.



- C = Measured length from optical centre of theodolite to apex of tripod after correcting for sag*
L = Horizontal distance
 θ = Bearing from previous point.
 β = Vertical angle

For the first reading the theodolite was placed on VSA-823 and , one tripod, on Henham and the other on the first temporary marker. The position of VSA-823 was already known as the bearing to Henham and the bearing on the first marker was readily calculated from the horizontal angle between it and Henham. The distances from the optical centre of the theodolite (conveniently marked by a red spot on the instrument) to the top of the tripod was taped and the vertical angle to the top of the tripod measured. The horizontal distance can then be calculated.

The bearing and range known, the position of the first marker was calculated. The two tripods and the theodolite were then each moved forward one position so that there were tripods over VSA-823 and the second stake and the theodolite over the first stake. This continued in like fashion all the way to the cave entrance and back to VSA-823.

The tape used was a surveyor's steel band, during the reading it was tensioned using a spring balance hooked into the end and each reading corrected for sag and temperature. There are several alternative tensions which may be used to avoid the band resting on, say, fence wire. Watch tapes, by the way, keep some tension on all the time when in use and tie the end to the reel when not - they tangle themselves very easily then kink and break when you try to sort them out.

The closing error (the amount VSA-823 had apparently moved whilst we were doing this) was 88 millimeters over a distance of 1098 meters.

CAVE SURVEY

And at last into the cave itself. The emphasis on the requirements from the instruments changed abruptly, ruggedness and portability became crucial, we opted for the hand held compass, clinometer and fibreglass tape - the surveyors band would have affected the compass.

We positioned markers throughout the cave, each marker being in line of sight to the preceeding and following one. The markers were small sticks with a square of white paper pushed into a slit in the top, these were pushed into the mud floor and were generally easy to read from and to. Where for some reason it was impossible to take a bearing from one, a back bearing was taken i.e. from the next marker backwards and the angle adjusted. Permanent markers (nails) were put in at intervals so that adding a new feature in the future would be simplified.

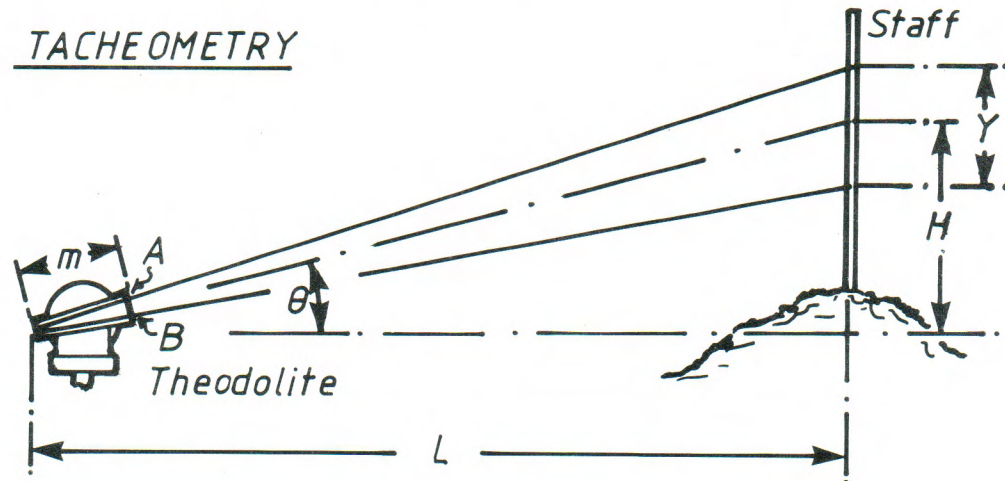
Illuminating the marker, both during the actual surveying and when ensuring that the next marker was in line of sight was both time consuming and a nuisance. On a later trip (to Dalley's) we used a Cyalume light stick as a target. This was suspended by a loop of string of a pre-set length, from a bolt positioned in the wall or roof, the bottom of the cyalume served as the target. The time taken for the survey was about halved using this method.

In either case the technique is to measure the distance, bearing and vertical angle between markers and to use them to calculate the vertical and horizontal distances. At each station a rough section is drawn noting in particular the position of the stick. Again the survey should be closed to identify errors.

TACHEOMETRY

Outside the cave again we rounded off the exercise with a bit of tacheometry. This is an elegant technique for mapping contours and uses a theodolite and staff. When looking through the theodolite you will have noticed two horizontal cursors above and below the cross hairs - you will have noticed because at some stage you too will have used the wrong one.

An artist will use the "Rule of Thumb". Measuring his distant subject against a raised thumb on an outstretched arm, he uses the concept of similar triangles to proportion his painting. Tacheometry is a sophistication of the same principal, the thumb is replaced by the two horizontal cursors on the theodolite lens, the subject by the staff and the eye by the optical centre of the theodolite. The technique is illustrated in Figure . The arrangement of lenses inside a theodolite is complex and it has been represented by a tube with a pin hole in one end, this illustrates the principle adequately but home constructors should avoid following the drawing too closely.



It can be shown that $L = KY \cos^2 \theta$

$H = KY \cos \theta \sin \theta$

Where $K = \text{Theodolite constant} \cdot \frac{m}{AB}$

The apparent distance between the cursors is read from the staff and corrected for the effect of the vertical angle (the staff is foreshortened because it is not viewed square on). The distance to the staff is this corrected apparent distance multiplied by a constant supplied by Theodolite manufacturers. This is the actual distance and is converted, again using the vertical angle, to give the horizontal and vertical distances.

The manufacturer of our theodolite was clever enough to make the cursor spacing vary as the vertical angle changed so that the corrections were not necessary.

To use the technique, the theodolite is placed at a known station and a target is placed over a second station to give a datum for the horizontal angle. The staff can be placed at any arbitrary point, the theodolite readings allow distance, height and direction (with reference to the known station) to be calculated, without need for taping or for establishing markers. The staffman just dashes from arbitrary point to arbitrary point and positions the staff whilst he pauses for breath and the surveyor takes the reading.

That summarises the techniques that were used. When nearby caves are mapped there will be an overall view of the formation of the system which will identify any sections worth pushing. There is a likely connection to M3 for example but until the latter cave is surveyed, it won't be known how fruitful the exercise will be.

Glen Netherwood

VSA

Safety and Techniques

ASF ABSEILING GUIDELINES

JUDITH BATEMAN

As Convenor of the Commission on Cave Safety, I would like to thank those clubs and individuals who took the time to read and comment on the draft guidelines which were circulated at the 1984 Council Meeting. A copy of the draft guidelines was also sent as an appendix to the minutes of that meeting.

The following is the final version of the Abseiling Guidelines.

ASF ABSEILING GUIDELINES

A. Choice of Ropes

1. Static, Kernmantle construction ropes of polyamide or polyester (nylon or terylene) should be used for abseiling.
2. Natural fibre ropes (manilla, hemp, cotton) should not be used as these are no longer manufactured to an acceptable standard.
3. The use of polyethylene or polypropylene ropes is not recommended as many of these ropes have an extremely low melting point.
4. It is recommended that ropes of 10-11 mm diameter be used. It is acknowledged that 9mm static ropes may be used if the pitch is rigged "free" or doubled for canyoning or through trips. It should be noted that abrasion resistance decreases as rope diameter decreases.

B. Care of Ropes

1. Ropes should always be carried in a rope pack. This protects the rope from sunlight, minimises the possibility of chemical contamination and protects the rope from mechanical damage during transportation.
2. Ropes should not be stored or transported in direct sunlight.
3. Ropes should be stored away from acids, alkalis, grease, oils, mud and other possible contaminants.
4. Ropes should be washed regularly.
 - On extended trips, muddy ropes may be washed in streams.
 - In the home, ropes should be washed in COLD water in a washing machine or bathtub. Pure soap flakes should be used. Detergents and washing powders are not recommended as some have additives that can be damaging to synthetic ropes. COMFORT fabric softener may be used in the final rinse.
5. It should be noted that wet, muddy conditions increase the danger of abrasion. Where possible ropes should be rigged to avoid these conditions and

failing that, ropes should be cleaned thoroughly after use.

6. Care should be taken to avoid treading on ropes as this accelerates rope abrasion by working grit into the fibres of the rope.

7. It is recommended that a log of rope usage be kept.

8. Ropes should be retired:-

- a after three years of regular use OR
- b if the outer sheath becomes badly worn along the length of the rope
- c if the core fibres are exposed OR
- d if a fall is sustained on the rope (STATIC ROPES should not be used as a belay on a lead climber) OR
- e if there is any doubt about the safety or history of the rope.

C. Choice of Belay points

1. Care should be taken in the choice of belay points. It is desirable that abseiling belays are backed up to a second belay point.
2. A second belay point should ALWAYS be used if there is any doubt about the strength of the primary belay.
3. Single artificial anchors should always be backed up to a second belay point.
4. The belay point should be checked by the abseiler before descending. Ideally, the belay point should be rechecked for signs of abrasion after an ascent.
5. It is desirable that the top edge should be protected.
 - The rope should also be protected from projections over which it is likely to rub on the pitch
6. Separate lifelines are not recommended:-
 - a a moving rope increases the danger of dislodging rocks, which in turn endangers both the abseiler and the abseiling rope
 - b the life line and the abseiling rope may foul.
7. Only abseiling methods which can be controlled by a bottom belay should be used.
8. When a bottom belay is used, care should be taken to protect the belayer from falling rocks.
9. It is recommended that a knot should always be tied in the end of the rope. This safety precaution ensures that an abseiler can never abseil off the end of a rope.
10. When the abseil/belay rope is used in conjunction with a ladder, it is desirable that separate anchor points be used for the rope and the ladder.

D. Through Trips

It is acceptable that double rope be used on through trips, although the following precautions should be observed.

1. The pull down should be checked before the last member of the party abseils. This is especially important when two ropes have been knotted together.
2. Ensure that the rope is untwisted before it is pulled down.
3. It is essential that at least one member of the party carries prussiking equipment and is competent in its use. It is essential that this person is competent to change from abseiling to prussiking and has the ability to cross knots.
4. In the event of a rope becoming stuck on the pull down, it is considered extremely dangerous to attempt to prussik on the stuck rope if there is any chance of the rope becoming unstuck as a result of the weight of the person prussiking.

E. Equipment

1. Descenders should be of the "in line" variety and should have an adequate mass to facilitate heat radiation. "In line" descending devices keep the rope in a straight line as it passes through the device, thus minimising problems of rope twist. In line descenders include rappell racks, whaletails, krab and piton, cross karabiners and krab and breakbar.
2. Figure eight style descenders are NOT recommended because:
 - a. they twist the rope which in extreme cases can result in the rope knotting on the pitch below the abseiler.
 - b. they put "spin" into kernmantle construction ropes by rearranging the alignment of the core. This is extremely undesirable if the rope is to be used for prussiking.
 - c. these descenders take the rope through several extremely tight turns within the device which puts spin into the rope. This is considered undesirable.
 - d. many of the devices are inadequate heat sinks and become extremely hot on abseils of relatively short distances.
3. Helmets should be worn when abseiling. If prussiking as well as abseiling, climbing helmets are considered to offer the best protection. All helmets should have a "quick release" chin strap. The sewn end of chin straps on climbing helmets should be unpicked before use.
4. Footwear
 - It is recommended that boots with an adequate tread be worn when abseiling in caves.
 - When abseiling above ground it is recommended that closed footwear with an adequate tread be used.
5. Gloves should always be worn when abseiling.
6. Harnesses
 - An appropriate abseil harness will hold the user in an upright sitting position. Some

commercial climbing harness are appropriate (but not all satisfy the above criteria), however, adequate harnesses can be tied from tape.

- It is recommended that a tied harnesses be made from new terylene tape (polyester) which is not less than 50mm (2") wide.
- A harness should consist of a combination of leg loops and a waist length
- It should be impossible to fall out of the harness in event of the abseiler turning upside down.

7. Knots

- In tape it is recommended that a tape knot be used. The double figure eight knot is also acceptable but is very bulky and often impractical.
- In rope of kernmantle construction the following knots are recommended:
 - the double figure of eight to form end line loops
 - the alpine butterfly to form a loop along the length of the rope
 - the double fishermans to join two ropes together.

Many knots that were used in ropes of hawser laid construction are inappropriate for use in kernmantle construction ropes, such knots rely on the "lay" of the rope to pack the knot.

F. Abseiling Methods

1. Classic and over the shoulder methods should not be used. Both these methods give severe rope burns and cannot be bottom belayed.
2. All appropriate abseiling methods require the use of a descending device of some description to provide adequate friction and to dissipate heat. Descending devices of the in line variety are recommended. These can be easily controlled by a bottom belay.
3. Descents should be undertaken in a controlled and smooth manner, jumping and bouncing can cause the belay point, rope and harness to be shock loaded. Excessive speed can cause descenders to become sufficiently hot that melting of synthetic ropes can occur.

G. Safety

1. Party leaders should be competent to effect a rescue of an abseiler caught on the rope, from above or below.
2. It is desirable that adequate basic rescue equipment be carried. (At the very least, a pully and spare krabs.)
3. Hair, beards and loose clothing should always be secured away from the abseiling device.

□ □ □ □ □ □ □ □ □ □ □ □ □ □

WHICH ROPE IS THE BEST?

It doesn't matter which rope you choose, it will undoubtedly be a compromise. No caving rope can be ideal for all purposes and much depends on what your particular needs are. To argue that one type of rope is the best and others are dangerous shows both ignorance of vertical caving and gross stupidity.

I consider the important criteria to be:

- 1 Weight
- 2 Handling
- 3 Abrasion Resistance
- 4 Price
- 5 Elongation in Use.

My order of preference reflects what I expect from my rope. It must be as light as possible so that more rope can be carried by fewer people. All other considerations are less important so I must choose from 9mm ropes. Given the choice between good or "poor" handling I would choose "good" even if it caused a loser in the 'lower' rate characteristics. I could fit more "good" handling rope into my pack than

"poor" handling rope. My choice involves some important compromises. I must rig my rope free of the rock because any 9mm rope has minimal abrasion resistance compared to an 11mm rope. If the rope is always rigged free then abrasion resistance is no longer a safety issue but one of useful lifetime of the rope. It should also be obvious that if one of the "lower" requirements were exceptional (eg. price) it might jump a notch or two in the priority scale. Mind you, even at 10¢ a metre, 13mm rope would be not worth considering if you were unable to carry enough of it to explore your cave. Naturally enough of the rope you would require for a walk-in-carry-the-lot-up-a-mountain trip would be different to what is best for use at Bungonia.

You must decide what you want. For most Australian caving 10mm would be the most suitable with 11mm if you really want to make the rope last longer or have people who will rarely or poorly use rope protection. 9mm would be ideal for vertical caving in Tassie or New Zealand if used correctly and with care or restricted to smaller pitches.

As I said, each rope has its merits.

ROPE	Dia. mm	Break strength (Static) KgF	Factor 1 Falls (80kg) survived	Elongation at Failure %	Elongation under 80kg dry rope		Abrasion Resistance		Handling Knotability		Weight g/m			
					new	old	new	used	new	old	NEW dry	NEW wet	OLD dry	OLD wet
Beal Dynastat	10.5	core 625 2020	4 - 8	-	4	6	1.5	2	2		70	110	77	111
Bluewater II	9	1829	3 - 10	20.8	6	11	5	1	1		52	74	60	85
	10	2800	3	20.8	1.5		3?	3	3?		80	90		
	11	3180	3	20.8	2	7.5	1	4	4		78	110	85	125
Bluewater Superline	13	3265	3	20.8	1.5		2?	3			82	115		
Edelrid Superstatic	9	2165		35	4.5		4?	2	3?		52	73		
	10	2640	5 - 10	29	2.5	7.5*	3	3		4*	63	89	74*	106*
	11	3150		30	3.5		1?	5	5?		75	109		
Viking	10	core 1122 1630		23	3		2?		6!		70	93		

RATINGS

1 = best 5 = worst

* very old rope, may have changed with new models.

? some form of estimate usually based on a similar rope

	+	-
Beal Dynastat 10.5 mm	best handling rope of its size, and stays that way with use, low cost, lighter than 11mm climbing ropes (canyon use) above average shock absorbing ability, wears well.	heavy when wet, dries slowly. New rope - no reputation for quality, not yet extensively tested.
Bluewater II 9 mm	good handling - you can fit an awful lot into a cave pack! lightweight ascenders run well.	expensive, high stretch, thinness scares those not used to it. Hard to hold. <u>Must</u> be rigged carefully.
Bluewater II 10 mm	will save some weight if carried, low stretch when new. Ascenders run well.	won't last unless rigged well, expensive.
Bluewater II 11 mm	long lasting, easy to hold. Requires little expertise to rig. Widely available.	heavy, poor handling with age. Expensive.
Bluewater Superline 13 mm	ideal for abseiling easy to see (orange) good handling, same weight as Bluewater 11mm.	hardly a caving rope, (designed for rescue) bulky, heavy. The ultimate in expense.
Edelrid Duperstatic 9 mm	light, low stretch for its size (when new) would probably wear well, cheap, ascenders run well, low weight increase when wet.	must be rigged carefully thinness scares people hard to hold, poor handling.
Edelrid Superstatic 10 mm	will save some weight if carried, low stretch, cheap, ascenders run well, long wearing low weight increase when wet.	won't last unless rigged well, poor handling
Edelrid 11 mm	easy to hold, requires little expertise to rig should wear well.	very stiff, heavy
Viking	light, core is fire resistant, core well protected by two sheaths should wear well.	stretches much more than manufacturers claim, extremely stiff, very low strength - less than some 8 mm ropes.

Edelweiss has recently released a new SRT rope in Australia (although it has been available for several years in Europe) the sheath colour of which looks remarkably like Bluewater! It comes in 10mm and 11mm and has an everdry treatment which could well save you some weight when the rope is wet as well as making it last longer and stay softer and cleaner. However, as a new rope it has not yet been extensively tested and consequently has no reputation, in Australia, for quality.

ALAN WARILD

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- BCRA news - little bits from many issues
- Wild issue 9 - whose rope survey got my sit harness knotted!

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- Sales pamphlets

TECHNIQUES de la Speleogie Alpine
- G Marbach, J L Rocourt.

DOWN UNDER ALL OVER

HILLS Hills Speleology Club Limited would like to make an apology to the editor for our failure to contribute to "Down Under All Over" during the past 2 years. This, however was not due to lack of subject matter, as the club has been extremely active during this time, but rather lack of application on the writers part. As this is our first article in "Down Under All Over" for 2 years, I shall give a brief resume of our activities, for 1983 and to date 1984.

1983 was a very active year for Hills Speleology Club Limited with trips eventuating (with very few exceptions) every weekend and even multiple trips on a few occasions. In short we visited Timor, Glenrock, Jenolan, Colong, Abercrombie, Bungonia, Mt Fairy, Wee Jasper, Taemas, Warroo, Narrangullen, Cave Flat, Chietmore, Marble Arch, Wyanbene, Flinders Ranges, Naracoorte, Tantanoola, North Byaduk, Attunga and Sulcor.

The most interesting of these trips were the visits to Cave Flat at Burrinjuck near Yass. As mentioned by C.S.S. in No 101 and ourselves in No 90 (A.S.F. Newsletter), the drought produced a unique opportunity to visit the "Lost Caves" of Burrinjuck.

With the capacity of the dam down to 3% the entire expanse of the Cave Flat limestone was exposed. It proved to be riddled with caves, a number of which were opened by H.S.C.L. In all, around thirty caves were discovered, mapped and documented by ourselves, as well as a surface survey of the limestone and cave entrances. The caves proved to be extremely well decorated with good examples of primary, secondary, and tertiary formations and a few, notably, "Atlantis" and "Main" containing spacious chambers. Cave Flat provided me with the most memorable experience of my relatively short caving life; a slow exploratory swim through 12 metre icy water, weaving through speleotherms of grand scale with no idea of what lay ahead. This was an experience we were never able to repeat due to the lower water levels encountered on the following trips. Unfortunately, the drought broke before we had a chance to tag any of these caves. The surface survey should reveal enough information for anyone wishing to explore the caves during the next drought.

The latter portion of 1983, saw the incorporation of the club thanks to a great deal of time and effort on the part of the committee, particularly the President (Darrell Warden) and the Treasurer (Ken Sale). Henceforth, the club shall be known as Hills Speleology Club Limited.

The beginning of 1984, there were three trips running concurrently; Timor (3 weeks), south east N.S.W. (3 weeks) and S.E. Australia (4 weeks). The Timor trip saw the extending of passage in TR48 ("Pord de Toor") the most recently discovered cave at Timor. Also a monumental cleaning operation was

undertaken and completed in "Helictite Extension" in "Glen-Dhu" cave. This is probably the most heavily decorated chamber in the Timor region, with masses of stalagmites, cave coral, flowstone and (as the name suggests) helictites all of which deserve the attention paid to them during the cleaning operation.

The south east N.S.W. trip included visits to Cleifden, Molong, Borenore, Wellington, Dripstone, and Abercrombie. The caves visited at Cleifden were "Main", "Molongolli", "Casurina", "Transmission", "Murder", and "Island".

From Cleifden, the party headed for Orange where they discussed tagging with Peter Dykes. From there they headed to Borenore where caves were tagged, and visits to the arch and Long Tunnel caves were made. Then to Molong for more tagging and a visit to a few caves took place.

The members turned tourist for a tour through Cathedral cave at Wellington Caves the following day and they drove to Dripstone to mark two large limestone outcrops on a topographical map.

The trip concluded with a week long stay at Abercrombie with M.S.S. Activities at Abercrombie included, tagging (about 40 caves), surveying (8 caves), surface survey (Grove Bluff), and a concert. Much time was spent in setting up for the concert which took place in the Grand Arch on Saturday, January 22nd. Performers included Questionaire (Folk and Gospel), Terry Discoll (Classical guitar), Hay Fever (Bushband) and Crystal Labyrinth (Peter Ceapa of H.S.C.L. on synthesizer and his brother Mick on percussion). The concert was a great success, being enjoyed by everyone, speleo's and tourists alike.

The S.E. Australia trip incorporated touring and caving in three states; South Australia, Victoria and New South Wales. After an all day drive to South Australia, on Boxing Day, we took a three day visit to the Flinders Rangers to admire the incredible tectonics. The folding, faulting, synclines and anticlines, of which the entire Flinders is a product, are strikingly contorted and the visual clarity of these tectonic formations is rivalled only by the Burrinjuck/Wee Jasper lens in New South Wales however, the Flinders is a much larger scale.

A short flight over Wilpena Pound made us appreciate the enormity of the Flinders and permitted us to take unique photographs. We spent an inebriated but rather uneventful New Years Eve in the Borossa Valley after sampling and purchasing more than a few wines during the day. After ridding ourselves of the inevitable New Years Day hangover we drove to Naracoorte for our first underground exploration of the trip. Thanks to C.E.G.S.A. we gained access to "Cathedral", "Tomato", "S'ick", "Wombat", and the tourist

DOWN UNDER ALL OVER

sections of "Alexandra", "Blanch" and "Victoria Fossil". We also had the privilege of visiting two incredibly beautiful caves in "Blackberry" and the back section of "Victoria Fossil". "Blackberry" in particular was magnificent with straws (yes plural) of lengths exceeding 3 metres, 15-20cm helictites ranging in colour from crystal clear through bright yellow, chocolate brown and even black. There were also black stalagmites, columns half full of water and a flowstone so clear that the bedrock was easily visible through 5cm of its thickness. We travelled from Naracoorte to Tantanoola where C.E.G.S.A. showed us through "Tantanoola Lake" cave. The most striking feature of this unique cave is the 20 metre diameter, 20 metre deep clear lake surrounded by a ring of columns and flowstones 10 metres tall. After a visit into Tantanoola tourist cave we said goodbye to C.E.G.S.A. and headed for Victoria via the Blue Lake at Mt Gambier. After a brief visit to the tourist cave at "Princess Margaret Rose" we headed for North Byaduk and the lava caves of the area. These caves are characterised by enormous entrances, spacious passages and a darkness which the brightest caving light finds difficult to pierce. The area is definitely worth the visit for the caving and the entrance photographs, however, photography within the caves is virtually impossible with the light absorbing ability of the volcanic bedrock. All in all we spent around 60 hours underground, travelled 5 1/2 thousand kilometers and spent the relatively low sum of around \$500 each. I would recommend this trip, especially Naracoorte and Buchan, to any club, though prior correspondence with C.E.G.S.A. and V.S.A. is essential. The weekend 12th February, 1984 was our first trip to Narrangullen since having completed the work at Cave Flat. The ground had broken and it was necessary to hire a boat to reach the caves. We first journeyed into the lower entrance which is at the base of a massive syncline about 5 metres above top water level. The river which runs through the cave was at a higher level than anyone could remember which added to the interest of this section although inconveniently causing us to get our feet wet. There was also evidence of a recent flood in this section with large amounts of newly deposited silt and fresh flood level marks on the walls. The tide marks on the walls were well above our heads indicating that during the flood it would have been impossible to enter. We ventured the 100 metres to the lower sump which is the source of the downstream river to find it full of water thus blocking access to the middle section of the cave. We returned to the boats, and headed for the entrance of the main upstream section of the cave. Upon entering

this section, one is struck by the size, the darkness (the effectiveness of our lights was reduced due to moisture on the walls and floor), and the sound of the river running some 10 metres below. The river is followed to a series of chambers where the party spent the next 4 hours photographing and exploring. The following day was spent exploring the bluff where we found a few well preserved fossils. 1984 will be an exciting year for the club as this is the eve of our 10th year. The trip list for the first 6 months has been set out and there are 20 trips planned over a total of 22 weekends. The club intends to publish a quarterly newsletter from now on with articles from the past (publication of the information completed by members of the club over the years) together with current information (brief trip reports, maps, etc).

NOTICES and NEWS

DID YOU KNOW ?

That in Belgium there is a caver who collects caving stickers from all over the world. He undoubtedly has the largest collection of caving stickers in the world.

The speleo is

Bernard Urbain
Rue des Deportes 18
B -5989 BOSSUT GOTTECHAIN
BELGIUM

he is keen and willing to swap caving stickers with cavers in Australia. So for yet another sticker for your car you may write to the above address. Yes he does read English. Don't forget to send him some of your club's stickers (at least two).

Information "ASF Secretaries"

THE CAVE RESCUE WEEKEND

The N.S.W. Cave Rescue Group will run the annual Cave Rescue Weekend at Bungonia on the 9/10 March 1985.

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The opinions expressed in this Newsletter are not necessarily those of the ASF Incorporated or the Editor.

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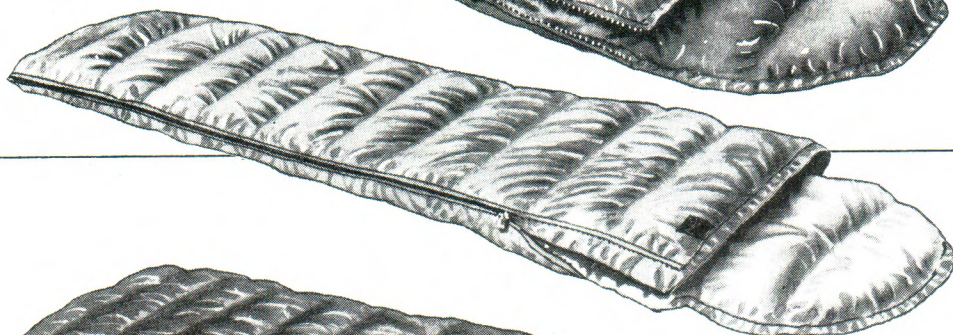
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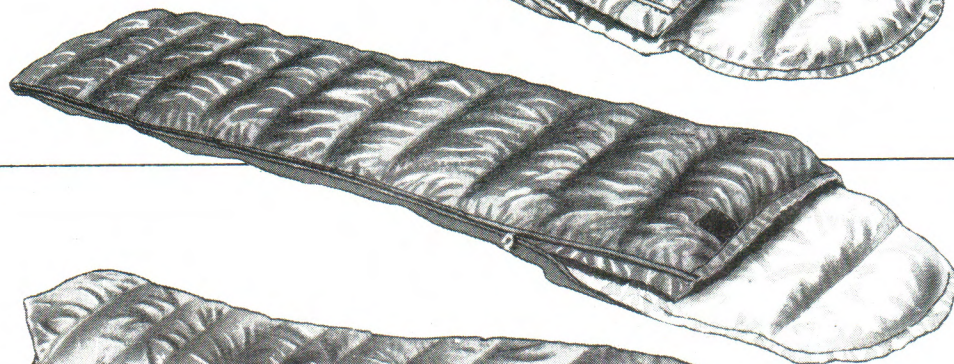
A big range of Paddymade bags -the choice is yours.



KIANDRA — compact! Mini size, mini weight with high quality and high comfort. Kiandra is a "3 season" semi-rectangular down-filled bag with ripstop nylon outer and cotton inner lining which ensures unlimited comfort. Able to mate with similar Paddymade bags. Kiandra's so small, ten will fit into an average size rucksack.



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PADDYMADE SLEEPING BAG COMPARISON CHART

MODEL	WEIGHT INC. STUFF SAC.	CONSTRUCTION	FILL WEIGHT	FILL	TEMP. RATING*	ZIP	SIZE IN STUFFSACK cm
KIANDRA	1.25 kg	Sewn Thru	500 g	550 Loft Down	5°C	Full Zip	30 x 17
BIMBERI	1.00 kg	Box Wall	550 g	550 Loft Down	-5°C	Side Zip	30 x 17
HIGH PLAINS	1.80 kg	Box Wall	1100 g	Featherdown	-5°C	Full Zip	34 x 23
HOTHAM	1.60 kg	Box Wall	700 g	550 Loft Down	-5°C	Full Zip	34 x 23
MELALEUCA	1.55 kg	Box Wall	800 g	550 Loft Down	-15°C	Side Zip	34 x 23
BOGONG	1.60 kg	Box Wall	900 g	550 Loft Down	-15°C	Full Zip	34 x 23
SNOWLORD	2.00 kg	Slant Wall	1100 g	550 Loft Down	-25°C	Side Zip	37 x 27

All bags fit people to 190 cm (6ft 3in) tall; bags to fit people 205 cm (6ft 9in) are available in most models.

* Temperature Ratings are a soft measurement — they represent an average expected performance level for a standard person although individuals will differ by up to $\pm 10^{\circ}\text{C}$. Paddymade reserves the right to alter these specifications without notice.



Paddy Pallin

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